

# Highly Reliable Structural Health Monitoring of Smart Composite Vanes for Jet Engine, Phase I

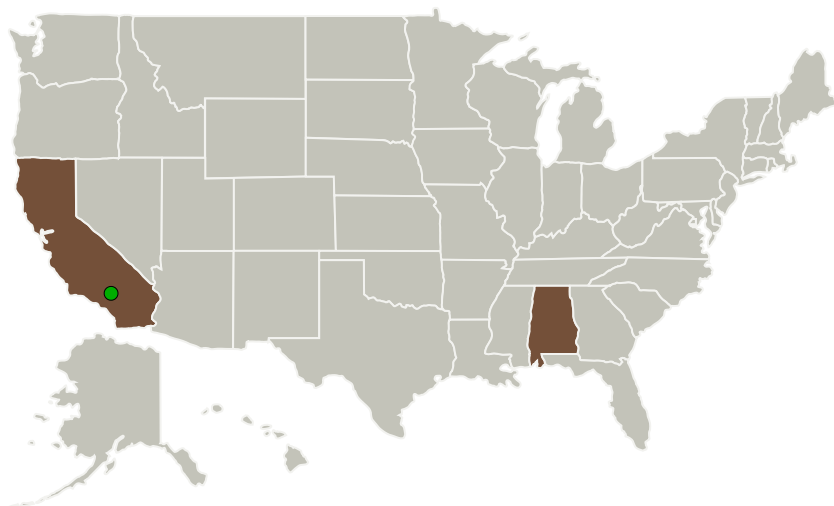
Completed Technology Project (2010 - 2011)



## Project Introduction

Intelligent Fiber Optic Systems and Auburn University propose a Fiber Bragg Grating (FBG) integrated Structural Health Monitoring (SHM) sensor system capable of providing in-situ crack detection, location and quantification of damage, as well as validating structural models, using recent advances in non-contact, non-destructive dynamic testing of composite structures. The key innovation is an FBG-based SHM system for detecting, locating and quantifying crack and de-lamination in composite structures such as smart, composite jet engine vanes with embedded FBG sensor systems. These new techniques make it possible to analyze complex structures not only non-destructively, but also without physically contacting or implanting electrical elements into test samples. The state-of-art FBG sensor system will be capable of measuring strains, stress, temperature and pressure and monitor damage to the structure under test at the same time at wide temperature ranges. IFOS and its university research collaborator will investigate the feasibility of such multi-functional FBG sensors with great potential for SHM. Advanced signal processing, system identification and damage identification, location and quantification algorithms will be applied. Potentially, the solution could evolve into an autonomous onboard monitoring system to inspect and perform Non-Destructive Evaluation and SHM.

## Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Intelligent Fiber Optic Systems Corporation	Lead Organization	Industry	Santa Clara, California
● Armstrong Flight Research Center(AFRC)	Supporting Organization	NASA Center	Edwards, California
Auburn University	Supporting Organization	Academia	Auburn, Alabama

## Primary U.S. Work Locations

Alabama	California
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## Project Transitions

▶ **January 2010:** Project Start

✓ **January 2011:** Closed out

### Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/140132>)

## Organizational Responsibility

### Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

### Lead Organization:

Intelligent Fiber Optic Systems Corporation

### Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

## Project Management

### Program Director:

Jason L Kessler

### Program Manager:

Carlos Torrez

### Principal Investigator:

Behzad Moslehi

### Co-Investigator:

Behzad Moslehi

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## Technology Maturity (TRL)

Start: **3**  
Current: **4**  
Estimated End: **4**



## Technology Areas

### Primary:

- TX08 Sensors and Instruments
  - └ TX08.3 In-Situ Instruments and Sensors
    - └ TX08.3.5 Electromagnetic Wave Based Sensors

## Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System